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Hjördis Segerlund

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**System for communication between remote objects and a central station**

**The invention relates to a system for communication between at least one remote object and at least one central station by means of transmitting and receiving means.**

**This system is especially suitable and provided for exchange of information and data between cars, trucks or other vehicles on the one hand and one or more central stations on the other hand, which are for example a service station of a manufacturer or a headstation for guiding or operating the vehicles. Further, the system is suitable and provided for communication with facilities and plants in remote areas which are operated, controlled, observed or monitored from one or more central stations.**

**The development of vehicles is a very time consuming process. A considerable part of the lead time for a vehicle project is the time for testing components and complete vehicles. These tests are affected with efficiency problems of different kinds. During the operation of such vehicle, there is no possibility to supervise the test and to verify the quality of the test or to check the quality of the data before the vehicle returns to the related station. Further, there is no possibility to change the test setup during operation, and it takes a long time between data acquisition and validation.**

**It is an object of the invention to provide a system and method by which the time for testing or checking components and / or complete vehicles is considerably reduced.**

**It is a further object of the invention to provide a system and method for increasing the efficiency of utilization of one or a plurality of vehicles which are travelling remote from at least one central station.**

**It is a further object of the invention to provide a system and method by which facilities and plants in remote areas are more efficiently operated, controlled, observed and / or monitored from at least one central station.**

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These and ther objects are achieved by a system for communication between at least one remote object and at least one central station by means of transmitting and receiving means, which is characterized in that each object comprises an interactive communication platform for representation of output signals of sensors which are installed at the object, and that a connection between a central station and each communication platform may be established for granting access to the same.

These and other objects are further achieved with a method according to claim 9.

This solution has several advantages. From the central station, a remote supervision of various operating conditions, measurement values or any other physical quantity detected by sensors, as well as an online data analysis may be conducted via the interactive communication platform. A remote file transfer of the test results leads to a considerable reduction of the time necessary for testing and checking the objects and their components during development process. The system as well allows supervision and maintenance of the objects in normal use or application. The system has advanced trigger capabilities and is very flexible and easy to adapt on different user demands and cases and is nevertheless very small and cheap.

The subclaims comprise advantageous embodiments of the solution according to claim 1.

According to claim 2, by providing actuating means, tests and / or operating parameters may be remotely configured, e.g. in dependence of measured values and the online data analysis.

According to claim 3, an object is a vehicle or a facility or a plant for controlling, affecting and monitoring the same during the development process as well as in the following normal use or application.

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Further details, features and advantages become apparent from the following description of preferred embodiments of the invention with reference to the drawings, in which shows:

Fig. 1 a first diagram of the components of an inventive system for a vehicle;

Fig. 2 a second diagram of the components of an inventive system for a vehicle; and

Fig. 3 a homepage as a essential part of the communication platform.

In Figur 1, the inventive system is shown for the communication of vehicles 10 with a central station 11 which comprises a computer with keyboard 111 and a display 110. The system allows integration and making use of the functionality of numerous stand alone networks and other units like one or more in-vehicle busses 12 (or networks which in turn can be of different type, e.g. optical busses), the internet 13 or a WAP (Wireless Application Protocol) system 126, a network for mobile telecommunication (GSM) via a cellular area 14 or satellite system 15, an intranet 16 which is an inhouse computer network in the central station and which may incorporate the knowledge of networking engineers, or a satellite navigation system 17 like GPS (global positioning system).

The in-vehicle bus 12 itself is connected with sensors 121 for measuring physical quantities and a storage 122 for storing these values, actuators 123 for actuating and affecting processes in the vehicle, as well as a computer 124 with keyboard and a display 125. The units within the vehicle constitute a mobile communication platform.

The inventive system takes use of all these units and makes them working together. The system is modularly built up by these units and can be developed continuously in connection with any of the other units, networks or components.

If a user at the central station 11 wants to communicate with one of the vehicles 10, he first starts an appropriate computer program or software on his desktop computer 111. This software is preferably a usual web browser or a similar other software. Then he

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types the name (or the IP-address) of the object 10 into the program. The name is then translated into an address, preferably by the station's intranet 16, and then transferred, whenever applicable, to the internet 13. If the addressed vehicle 10 is found in the network, a connection between the vehicle and the central station 11 is established via the cellular network which is for example the GSM-network 14 or the satellite system 15 and the user has access to the communication platform of the vehicle. The vehicle can further graphically be located via a linked map site. For this purpose, the satellite navigation system 17 (GPS) may be used.

Figur 2 shows an alternative configuration of the inventive system with more details. The mobile communication platform 20 comprises a storage 21 for HTML-pages, an FTP-server 22, a HTTP-server 23 and a gateway 24. These units are controlled by an operating system 25 and a triggering and logging application 26. A unit under test 30 is connected via an RS-232/Ethernet interface with TCP/IP (PPP) protocol with the gateway 24. Further, a keyboard with display 31 and a GPS receiver 32 are connected with the operating system 25, while other in-vehicle links or bussystems 33 (like J1708/J1587) are connected to the triggering and logging application 26. The FTP-server 22 and HTTP-server 23 are linked via an RS-232/Ethernet interface with TCP/IP (PPP) protocol with a transmitting and receiving means 34 in the form of a GSM/GPRS/Satellite system which can establish a switched connection 40 to a modem pool and IP-telefon router 41. This router 41 is connected via Internet or Intranet 42 with a PC-application 43 at the central station which comprises special set up software 44 for any unit under test 30, a triggering and logging application 45 and a web browser 46 like Netscape. The unit under test 30 may be any component in a vehicle which is accessible from the central station via the homepage of the vehicle.

Figur 3 shows a homepage which is presented for the user after connection with the addressed vehicle (or another object) has been established. This homepage is a major part of the communication platform which further comprises the computer 124 and software for generating the homepage. In Figur 3, the homepage contains any information and data monitored in connection e.g. with development, test, operation,

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maintenance, navigation, load r guidance of the vehicle and/or one of its components

30. Additional data to be monitored can be user defined. All these data and information are stored in the storage 122 (Figur 1) or storage 21 (Figur 2) and are accessible for the user for evaluation and any other purpose via the homepage.

Further, the homepage comprises interactive fields or buttons which when activated by a computer mouse of the user, affect actuators or other means in the vehicle. With such actuators, changes of any operation, performance or maintenance parameters, of a test setup or a configuration of a test, or a software configuration in the vehicle may be conducted by the user.

The application of the inventive system in the development process of vehicles has the advantage that by the online communication and activation a considerable part of the lead time for the vehicle testing will decrease due to better supervising, less travels, faster responds at field problems, a much higher efficiency in utilization the test vehicle, a faster way to verify the quality of the test before the vehicle returns, increased availability of test vehicles world wide, fast error diagnostics and fast feedback on test results. In general, there will be a shortened lead time from initiating a test to the fulfilled report, reduced costs and increased quality.

A further advantage resides in the fact that such a remote vehicle testing system enables advanced diagnostics and data logging. This means that problem adapted measurements can be run by the user from the central station 11. Further, by advanced post mortem triggering capabilities, any errors can be trapped. Online data analysis makes the GSM bandwidth no obstacle for file transfers. During time periods of interrupted or inactive connection between a vehicle 10 and the central station 11, the data detected by the sensors are stored in the storage 122 for later access by the user. Finally, also a driver of the vehicle may have access to the homepage for initiating diagnostics in case of failure or any other purpose.



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In addition, the inventive system offers a complete system for in-vehicle data logging and diagnostics. Its remote capabilities dramatically increase the testing efficiency. The modularity of the system allows the user to adapt the system for any purpose and can also be integrated with other measuring tools. The system can monitor all in-vehicle data (e.g. J1939 and J1587 bus) and all kinds of analogue and digital sensors.

The modularity of the system resides in several subsystems. First, there is provided the remote vehicle testing subsystem which monitors the J1587 bus and GPS data with advanced triggering capabilities (e.g. entering range, level triggering, using boolean expressions for combined triggers). It is remotely connected to the central station 11 via a GSM/CDMA/GPRS-network and allows online data analysis. It also includes the computer 124 with a web server for generating the homepage.

Second, the system comprises a high performance data acquisition subsystem which can measure any physical quantity and which comprises the vehicle's internal data bus 12. This subsystem includes the sensors 121, the actuators 123 and a highly advanced triggering and online data analysis functionality (e.g. rain flow/pair analysis, histogram, multi dimensional analysis etc.) It can be remotely controlled via the first subsystem.

Especially for normal operation, the system offers applications as a common tool for in-vehicle statistic data logging, a "black box" in a vehicle for recreating course of events and also a communication platform for after market diagnostic tools.

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**Claims**

1. System for communication between at least one remote object and at least one central station by means of transmitting and receiving means, characterized in that each object (10) comprises an interactive communication platform for representation of output signals of sensors (121) which are installed at the object, and that a connection between a central station (11) and each communication platform may be established for granting access to the same.

2. System according to claim 1, characterized in that actuators (123) at the object (10) are accessible via the communication platform.

3. System according to claim 1 or 2, characterized in that the objects (10) are vehicles, plants and / or facilities.

4. System according to claim 3, characterized in that by means of the communication platform an exchange of information between the central station (11) and a person at the object (10) may be conducted.

5. System according to one of the preceding claims, characterized in that the communication platform comprises means (124) for generating a homepage.

6. System according to one of the preceding claims, characterized in that the connection is established via an internet (13) and a mobile telecommunication network (14).

7. System according to one of claims 1 to 4, characterized in that the connection is established via an internet (13) and a satellite connection network (15).

8. System according to one of the preceding claims,  
characterized in that the sensors (121) at the object are provided for detecting operating  
parameters of the object.
9. System according to one of the preceding claims,  
characterized in that the actuators (123) are provided for affecting and actuating  
operation parameters of the object.
10. System according to one of the preceding claims,  
characterized in that the communication platform comprises at least one of sensors  
(121), actuators (123), one or more in-object busses (12), a storage (122) and a  
computer (124) with software for generating a homepage for representing output signals  
of the sensors and for actuating the actuators from a central station.
11. Means for remotely testing, operating, controlling, observing or monitoring of at  
least one object from at least one central station,  
characterized in a system according to one of the preceding claims.
12. Method for remotely testing, operating, controlling, observing or monitoring of at  
least one object from at least one central station,  
characterized in that communication between the at least one object and the at least one  
central station is established and conducted with a system according to one of claims 1  
to 10.

**Abstract**

**The invention relates to a system for communication between at least one remote object (10) and at least one central station (11) by means of transmitting and receiving means and is characterized in that each object (10) comprises an interactive communication platform for representation of output signals of sensors (121) which are installed at the object, and that a connection between a central station (11) and each communication platform may be established for granting access to the same. (Fig. 1)**



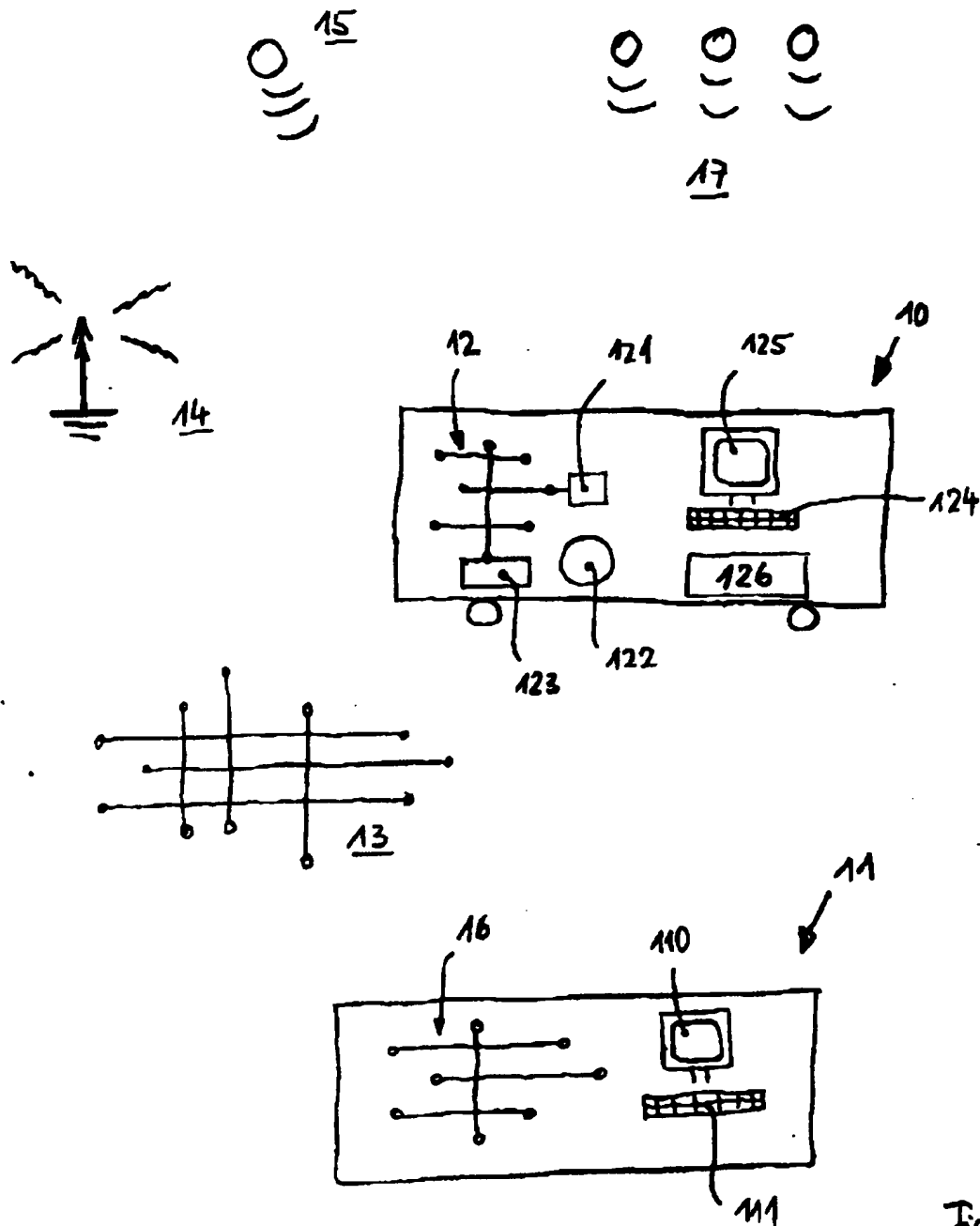


Fig. 1

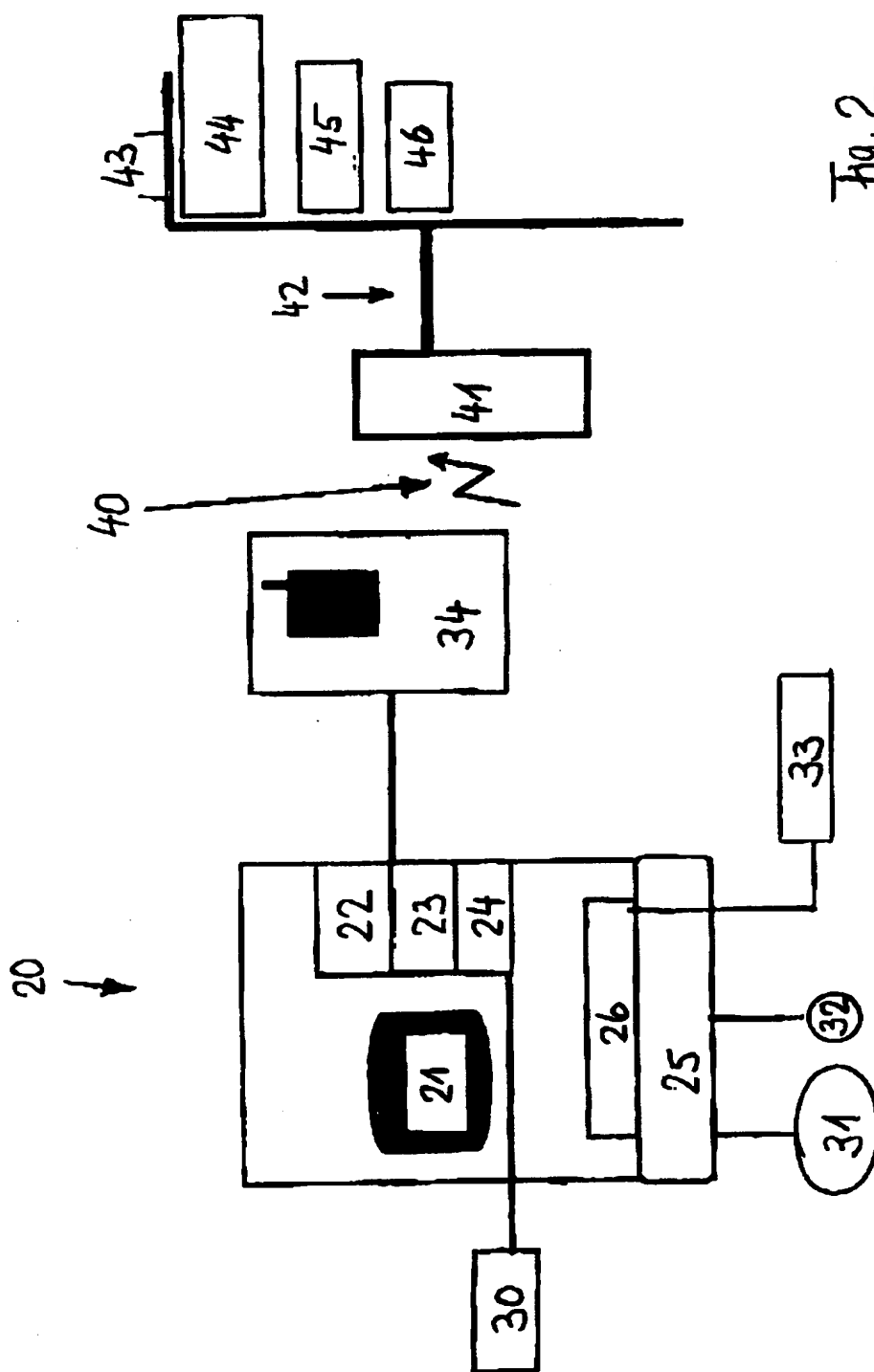


Fig. 2

